

[TITLE OF THE DOCUMENT] CLAIMS

[CLAIM 1]

A foldable portable telephone comprising a body cabinet (1) and a cover cabinet (2) openably/closably coupled to each other; a microphone (14) and a first speaker (41) disposed on inner surfaces of the body cabinet (1) and the cover cabinet (2) in positions opposed to each other with the both cabinets closed; and a second speaker (42) disposed on a rear surface of the cover cabinet (2), wherein it is possible to set a first call mode for causing the microphone (14) and the first speaker (41) to function with the both cabinets opened and a second call mode for causing the microphone (14) and the second speaker (42) to function with the both cabinets closed, the foldable portable telephone being characterized in that the microphone (14) is rotatably disposed at an end of the body cabinet (1), and is set in the first call mode to a first rotational posture where it faces the inner surface side of the body cabinet (1), and set in the second call mode to a second rotational posture where it faces a direction deviating from the cover cabinet (2) in a closed position.

[CLAIM 2]

The foldable portable telephone according to claim 1, wherein the microphone (14) is incorporated in a transmission unit (15) rotatably disposed on an end of the cover cabinet

(2), and the transmission unit (15) comprises a sound collecting hole (13) for introducing a sound wave toward the microphone (14).

[CLAIM 3]

5 The foldable portable telephone according to claim 2, wherein the transmission unit (15) is rotationally driven by manual operation.

[CLAIM 4]

10 The foldable portable telephone according to claim 2, wherein the transmission unit (15) is rotationally driven by a reciprocation drive device.

[TITLE OF THE DOCUMENT] SPECIFICATION

[TITLE OF THE INVENTION] FOLDABLE PORTABLE TELEPHONE

[TECHNICAL FIELD]

[0001]

5 The present invention relates to a foldable portable telephone including a pair of cabinets openably/closably coupled to each other, and particularly to a foldable portable telephone having a hands-free function, which allows communication with the both cabinets closed.

10 [BACKGROUND ART]

[0002]

 In recent years, foldable portable telephones have been making progress in multi-functionalization along with being made smaller and thinner. Development is in progress of
15 foldable portable telephones with a hands-free function, which allow communication even with the both cabinets closed and placed on a desk (see, for example, Patent Documents 1-3).

[0003]

20 FIG. 5 and FIG. 6 show a structure of a foldable portable telephone having a hands-free function, which includes a body cabinet 8 and a cover cabinet 9 openably/closably coupled to each other through a hinge mechanism 83. A plurality of manual keys 81 and a

transmitter 82 are disposed on an inner surface of the body cabinet 8, while a microphone 84 is disposed inside the body cabinet 8 toward the transmitter 82.

5 The cover cabinet 9 has an inner surface provided with a main display 91 and a first receiver 92 disposed in a position to be opposed to the transmitter 82 with the both cabinets 8, 9 closed. A second receiver 93 is disposed on a rear surface of the cover cabinet 9. The cover cabinet 9 has an interior provided with a first speaker 94 disposed toward
10 the first receiver 92 and a second speaker 95 disposed toward the second receiver 93.

A first projection 85 projects near the transmitter 82 of the body cabinet 8, while a second projection 96 projects near the first receiver 92 of the cover cabinet 9, the both
15 projections 85, 96 being in contact with each other with the both cabinets 8, 9 closed.

[0004]

With the foldable portable telephone, when the both cabinets 8, 9 are closed as shown in FIG. 6, a cabinet
20 open/close detector (not shown) detects that the both cabinets 8, 9 are closed to feed a detection signal based on the detection to a control circuit (not shown). The control circuit causes the microphone 84 and the second speaker 95 to function in response to the detection signal. Consequently,

speech transmission and reception using the microphone 84 and the second speaker 95 become possible in a hands-free condition where the both cabinets 8, 9 are closed and placed on a desk.

- 5 [Patent Document 1] JP 2003-18257, A [H04M1/02]
 [Patent Document 2] JP 2003-51871, A [H04M1/02]
 [Patent Document 3] JP 2003-134201, A [H04M1/02]

[DISCLOSURE OF THE INVENTION]

[PROBLEM TO BE SOLVED BY THE INVENTION]

10 [0005]

 However, when speech transmission and reception are performed with the both cabinets 8, 9 closed as shown in FIG. 6, vibration of the second speaker 95 can be transmitted to the first speaker 94 through the air inside the cover cabinet 9 to thereby vibrate the first speaker 94. This can cause the first speaker 94 to emit a sound wave having a waveform approximated to that of a sound wave emitted from the second speaker 95. The sound wave emitted from the first speaker 94 can be transmitted to the microphone 84 because the first speaker 94 is opposed to the microphone 84 through the first receiver 92 and the transmitter 82. Consequently, a loop of an acoustic transmission path can be formed between the second speaker 95 and the microphone 84 through the first speaker 94. This can transmit the other party's voice

emitted from the second speaker 95 to the microphone 84, which has been causing a problem of generating a phenomenon where that voice is transmitted to the other party, i.e., howling.

5 [0006]

Accordingly, an object of the present invention is to suppress a howling phenomenon in a foldable portable telephone with a hands-free function including an openably/closably coupled pair of cabinets.

10 [MEANS FOR SOLVING THE PROBLEM]

[0007]

In a foldable portable telephone of the present invention, a body cabinet 1 and a cover cabinet 2 are openably/closably coupled to each other. A microphone 14 and
15 a first speaker 41 are disposed on inner surfaces of the body cabinet 1 and the cover cabinet 2 in positions opposed to each other with the both cabinets closed, while a second speaker 42 is disposed on a rear surface of the cover cabinet 2. It is possible to set a first call mode for causing the
20 microphone 14 and the first speaker 41 to function with the both cabinets opened and a second call mode for causing the microphone 14 and the second speaker 42 to function with the both cabinets closed.

In the foldable portable telephone, the microphone 14

is rotatably disposed at an end of the body cabinet 1, and is set in the first call mode to a first rotational posture where it faces the inner surface side of the body cabinet 1, and set in the second call mode to a second rotational posture where it faces a direction deviating from the cover cabinet 2 in a closed position.

[0008]

The microphone 14 is incorporated, for example, in a transmission unit 15 rotatably disposed on an end of the cover cabinet 2, and the transmission unit 15 comprises a sound collecting hole 13 for introducing a sound wave toward the microphone 14.

The transmission unit 15 is rotationally driven by manual operation, or rotationally driven by a reciprocation drive device, between the first rotational posture and the second rotational posture.

[0009]

With the above-described foldable portable telephone of the present invention, the first call mode is set by opening the body cabinet 1 and the cover cabinet 2 to cause the microphone 14 and the first speaker 41 to function, allowing a call using the microphone 14 and the first speaker 41. When a user makes a call with the first speaker 41 held close to his ear and the microphone 14 close to his mouth, the

sound is efficiently collected because the sound collecting direction of the microphone 14 is directed to the user's mouth by setting the microphone 63 to the first rotational posture.

5 [0010]

On the other hand, the second call mode is set by closing the body cabinet 1 and the cover cabinet 2 to cause the microphone 14 and the second speaker 42 to function, allowing a hands-free call using the microphone 14 and the
10 second speaker 42 with the portable terminal placed on a desk. The cover cabinet 2 will not prevent sound collection of the microphone 14 because the sound collecting direction of the microphone 14 is directed to a direction deviating from the cover cabinet 2 in a closed position by setting the
15 microphone 14 to the second rotational posture.

[0011]

Even when the first speaker 41 and the microphone 14 become opposed to each other by closing the body cabinet 1 and the cover cabinet 2, the sound collecting direction of
20 the microphone 14 is directed to a direction deviating from the cover cabinet 2 in a closed position, i.e., a direction deviating from the first speaker 41 of the cover cabinet 2. Therefore, even if a sound wave from the second speaker 42 vibrates the first speaker 41 through the air in the cover

cabinet 2, the sound thus generated will not be input into the microphone 14 with large sound pressure.

[EFFECT OF THE INVENTION]

[0012]

5 The foldable portable telephone of the present invention suppresses howling phenomena because, even if the first speaker 41 is vibrated by a sound wave emitted from the second speaker 42 when a call is made with a hands-free function with the body cabinet 1 and the cover cabinet 2
10 closed, the sound thus generated will not be input into the microphone 14 with large sound pressure.

[BEST MODE FOR CARRYING OUT THE INVENTION]

[0013]

 An embodiment of the present invention will be
15 specifically described below with reference to the drawings.

 As shown in FIG. 1 and FIG. 2, a foldable portable telephone of the present invention includes a body cabinet 1 coupled to a cover cabinet 2 through a hinge mechanism 3. The both cabinets 1, 2 are foldable with an inner surface of
20 the body cabinet 1 and an inner surface of the cover cabinet 2 opposed to each other.

[0014]

 As shown in FIG. 1, the body cabinet 1 has a plurality of manual keys 11 disposed on the inner surface thereof, and

a transmission unit 15 provided with a sound collecting hole 13, attached to an end separate from the hinge mechanism 3.

On the other hand, the cover cabinet 2 has a main display 21 disposed on the inner surface thereof, and a receiver 22 provided with a sound emitting hole 25, disposed at an end separate from the hinge mechanism 3. As shown in FIG. 2, the cover cabinet 2 has a rear surface provided with a sub display 23, and a sound emitter 24 provided with a plurality of sound emitting holes 26, disposed between the sub display 23 and the hinge mechanism 3.

[0015]

As shown in FIG. 4, inside the cover cabinet 2, a first speaker 41 is disposed toward the receiver 22, while a second speaker 42 is disposed toward the sound emitter 24.

The transmission unit 15 includes a microphone 14 contained inside a cylindrical tube piece 12. The tube piece 12 is supported rotatably relative to the body cabinet 1 on an axis parallel with a rotation axis of the hinge mechanism 3. The tube piece 12 is provided with a sound collecting hole 13 for introducing a sound wave toward the microphone 14 in a position opposed to a sound receiving surface (not shown) of the microphone 14.

[0016]

The transmission unit 15 is rotatable approximately 90

degrees between a first rotational posture where the sound collecting hole 13 faces the inner surface side of the body cabinet 1 as shown in FIG. 3(a) and a second rotational posture where the sound collecting hole 13 faces the end surface side of the body cabinet 1 as shown in FIG. 3(b).

The tube piece 12 of the transmission unit 15 has saw-tooth projections and depressions carved on both sides of the outer peripheral surface to form manipulation portions 16, 16 for rotationally manipulating the transmission unit 15.

10 [0017]

With the above-described foldable portable telephone of the present invention, a first call mode is set by opening the body cabinet 1 and the cover cabinet 2 as shown in FIG. 1 to cause the transmission unit 15 and the first speaker 41 to function, allowing a call using the transmission unit 15 and the first speaker 41. When a user makes a call with the first speaker 41 held close to his ear and the transmission unit 15 close to his mouth, the sound is efficiently collected because the sound collecting hole 13 of the transmission unit 15 is directed to the user's mouth by setting the transmission unit 15 to the illustrated first rotational posture.

20 [0018]

On the other hand, a second call mode is set by closing

the body cabinet 1 and the cover cabinet 2 as shown in FIG. 2 to cause the transmission unit 15 and the second speaker 42 to function, allowing a hands-free call using the transmission unit 15 and the second speaker 42 with the portable phone placed on a desk. The cover cabinet 2 will not prevent sound collection of the transmission unit 15 because the sound collecting hole 13 of the transmission unit 15 is exposed from the cover cabinet 2 in a closed position by setting the transmission unit 15 to the illustrated second rotational posture.

[0019]

Even if a sound wave from the second speaker 42 vibrates the first speaker 41 through the air in the cover cabinet 2, the sound thus generated will not be input into the microphone 14 with large sound pressure because, as shown in FIG. 4, the sound collecting hole 13 of the transmission unit 15 can face a direction deviating from the first speaker 41 of the cover cabinet 2.

Therefore, a howling phenomenon, where the other party's voice emitted from the second speaker 42 is input through the first speaker 41 into the microphone 14 and transmitted to the other party, is suppressed more sufficiently than in the conventional foldable portable telephone shown in FIG. 6, which gives the other party no

displeasure.

[0020]

The present invention is not limited to the foregoing embodiment in construction but can be modified variously within the technical scope defined in the appended claims. For example, the transmission unit 15 is rotationally driven not only by manual operation, but may be rotationally driven by a motor or a solenoid in conjunction with opening/closing of the body cabinet 1 and the cover cabinet 2. Furthermore, the microphone 14 may be rotationally driven by itself, and selectively diverted relative to two sound collecting holes provided in the tube piece 12 fixed to the body cabinet 1.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[0021]

[FIG. 1] is a perspective view of a foldable portable telephone of the present invention in an open state.

[FIG. 2] is a perspective view of the above in a closed state.

[FIG. 3] is a perspective view showing a transmission unit in a first rotational posture and a second rotational posture.

[FIG. 4] is an enlarged sectional view of the foldable portable telephone of the present invention in a closed state.

[FIG. 5] is a sectional view of a conventional foldable portable telephone in an open state.

[FIG. 6] is a sectional view of the above in a closed state.

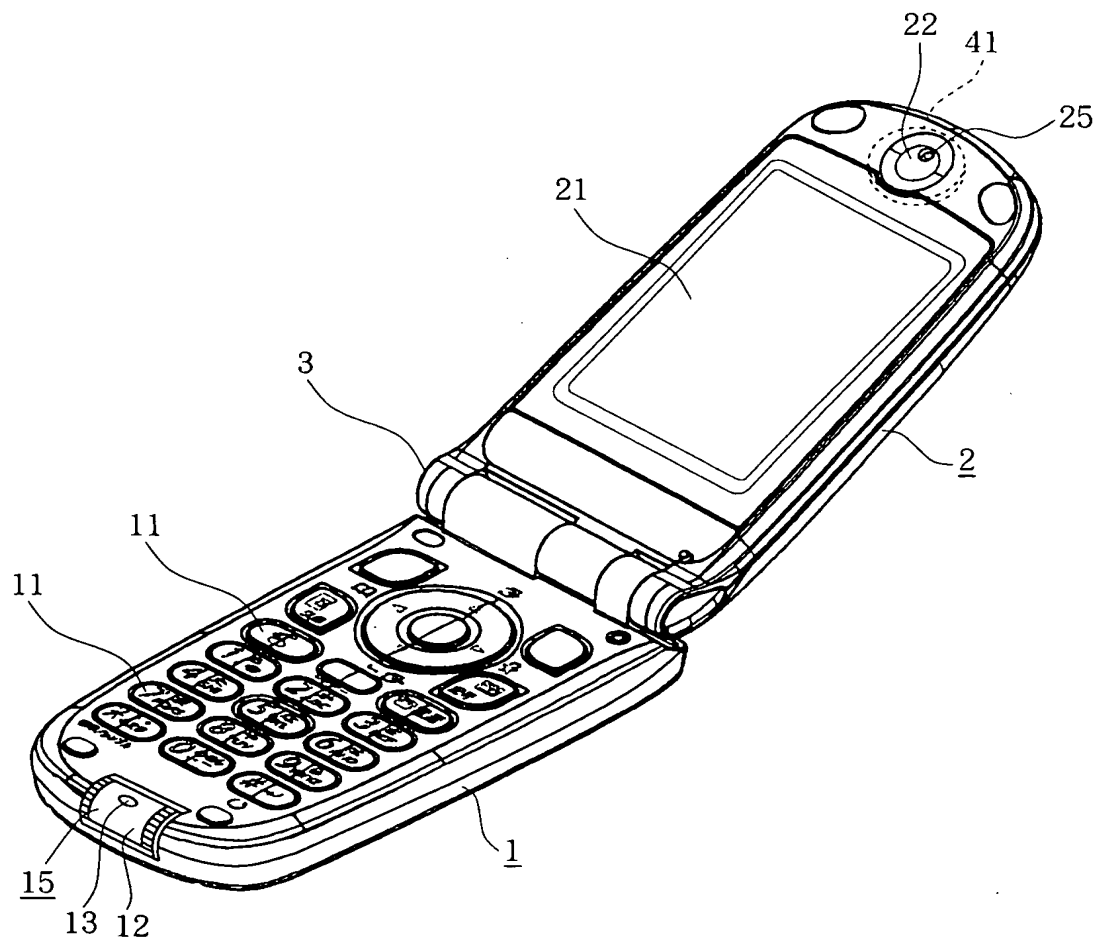
5 [EXPLANATION OF REFERENCE NUMERALS]

[0022]

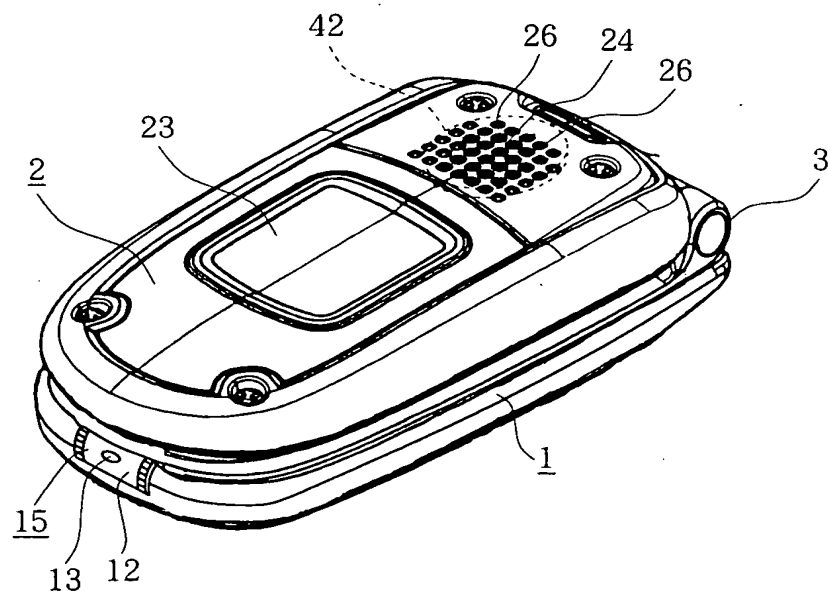
- (1) body cabinet
- (11) manual key
- (12) tube piece
- 10 (13) sound collecting hole
- (14) microphone
- (15) transmission unit
- (2) cover cabinet
- (21) main display
- 15 (22) receiver
- (24) sound emitter
- (25) sound emitting hole
- (26) sound emitting hole

[TITLE OF THE DOCUMENT]

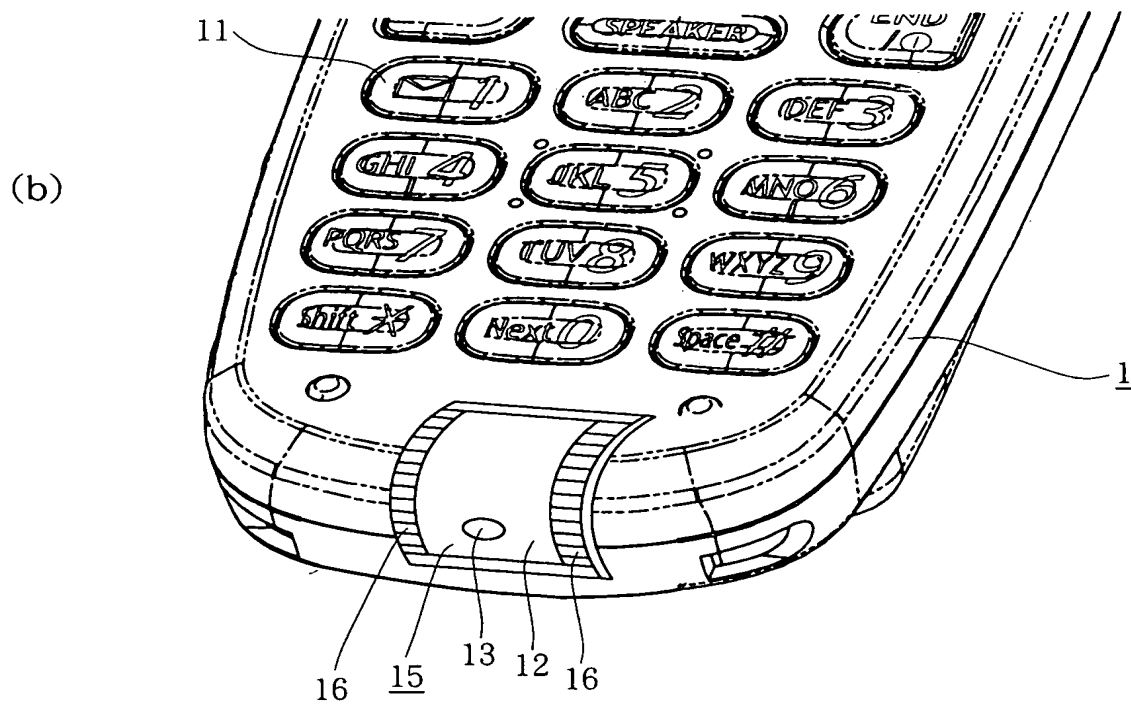
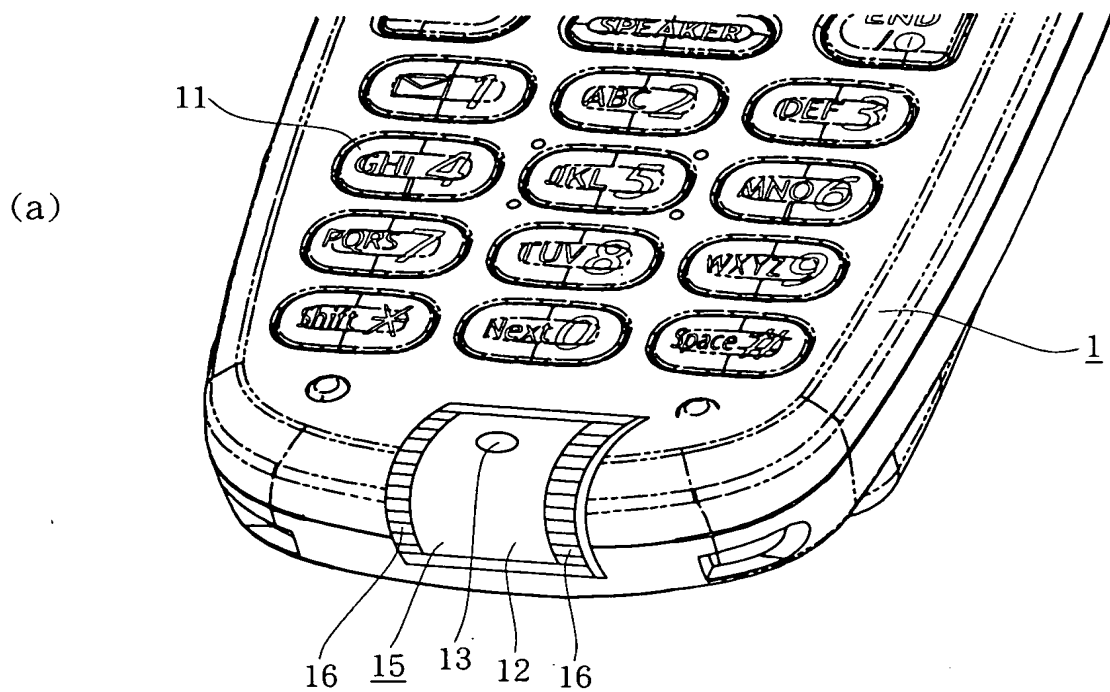
[FIG. 1]



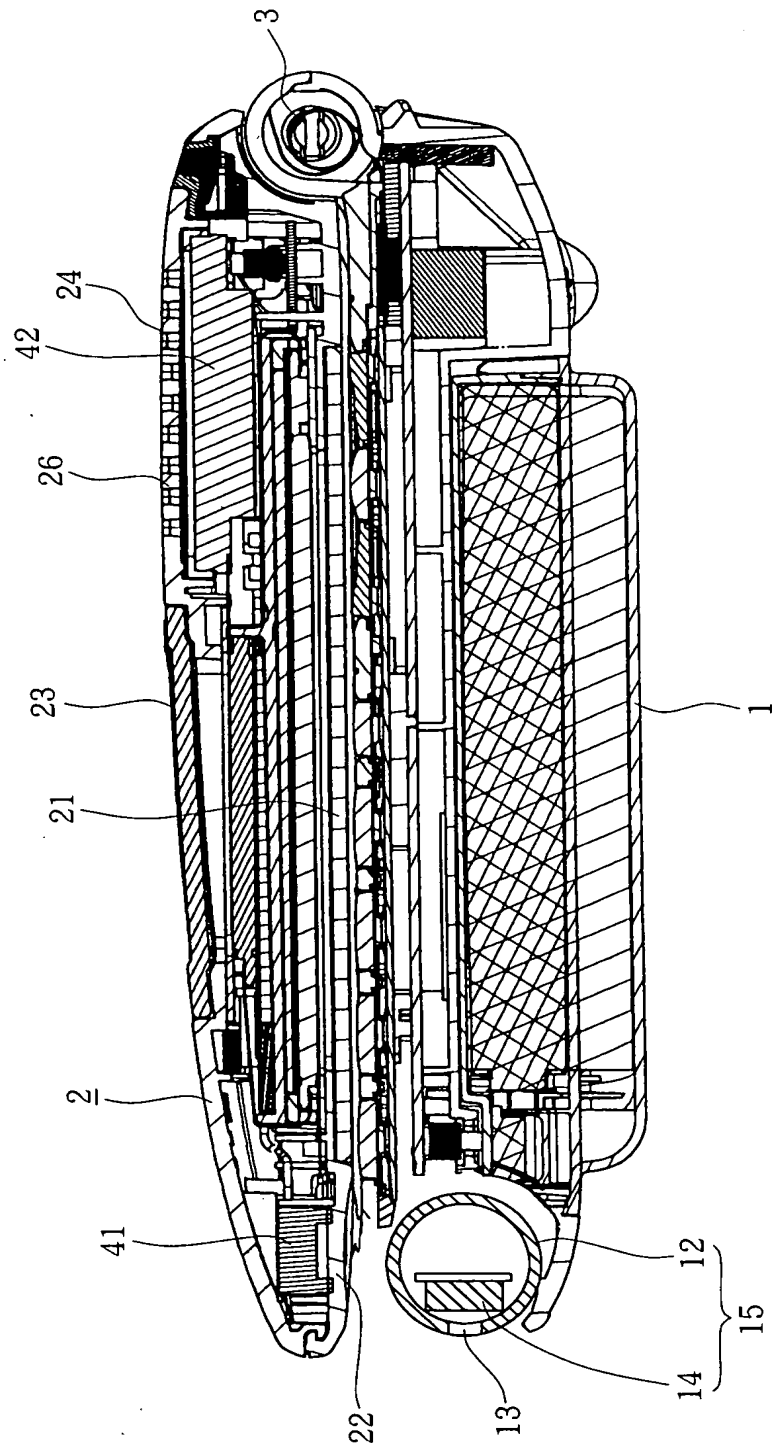
[FIG. 2]



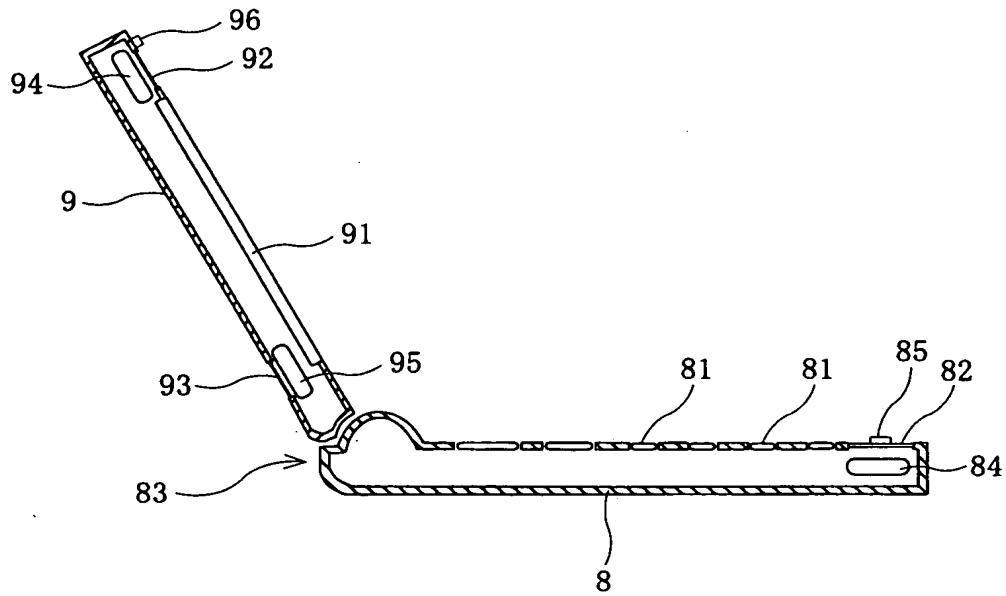
[FIG. 3]



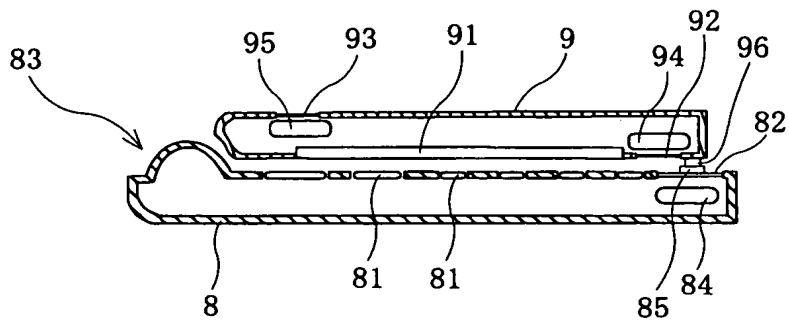
[FIG. 4]



[FIG. 5]



[FIG. 6]





[TITLE OF THE DOCUMENT] ABSTRACT

[ABSTRACT]

[PROBLEM] To suppress howling phenomena in a foldable portable telephone having a hands-free function.

5 [SOLUTION] A foldable portable telephone of the present invention includes a transmission unit 15 and a first speaker 41 disposed on inner surfaces of a body cabinet 1 and a cover cabinet 2, and a second speaker 42 disposed on a rear surface of the cover cabinet 2. The microphone transmission unit 15
10 is rotatably disposed at an end of the body cabinet 1. The transmission unit 15 is set to a first rotational posture where it faces the inner surface side of the body cabinet 1 in a call mode for causing the transmission unit 15 and the first speaker 41 to function with the both cabinets opened,
15 and set to a second rotational posture where it faces a direction deviating from the cover cabinet 2 in a closed position in a second call mode for causing the transmission unit 15 and the second speaker 42 to function with the both cabinets closed.

20 [CHOSEN DRAWING] FIG. 1